



California Regional Water Quality Control Board

Central Coast Region



Terry Tamminen
Secretary for
Environmental
Protection

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Arnold Schwarzenegger
Governor

June 10, 2004

Mr. Richard W. McClure
Olin Corporation
Environmental Remediation Group
PO Box 248
Charleston, TN 37310-0248

Mr. Jay McLaughlin
President and CEO
Standard Fusee Corporation
PO Box 1047
Easton, MD 21601

Dear Messer's McClure and Mr. McLaughlin:

SLIC: 425 TENNANT AVENUE, MORGAN HILL; REMEDIAL ACTION WORK PLAN & 90% DESIGN REPORT FOR SOIL REMEDIATION, 425 TENNANT AVENUE FACILITY, SANTA CLARA COUNTY

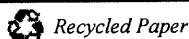
Regional Board staff have reviewed the *Remedial Action Work Plan & 90% Design Report for Soil Remediation* (RAWP) submitted April 8, 2004. Regional Board staff met with Olin and their consultant, GeoSyntec Consultants on April 15, 2004 to clarify and discuss the RAWP. We have received and considered additional comments from Komex on the behalf of the Cities of Morgan Hill and Gilroy and the Santa Clara Valley Water District (SCVWD). Copies of these comments are attached for your review and consideration.

As requested by the Regional Board in our February 9, 2004 letter, the RAWP details the design and implementation of treatment option 4A: *Focused excavation and ex situ bioremediation coupled with in situ bioremediation*, as presented in the Soil Remediation Feasibility Study. The two main components of the treatment option include: ex situ anaerobic bioremediation of perchlorate-contaminated soils greater than 7,800 µg/kg, the United States Environmental Protection Agency (US EPA) residential Preliminary Remedial Goal (PRG), and in situ bioremediation of soils above the site-specific soil screening level of 50 µg/kg. The site specific soil remediation goal is derived from the methods described in the US EPA's *Soil Screening Guidance: Users Guide* and is the calculated concentration of perchlorate that would not result in groundwater impacts above 4 µg/kg.

Regional Board staff approves the overall design and implementation detailed in the RAWP. The Regional Board will consider a waiver of Waste Discharge Requirements for the enhanced bioremediation substrate application at its July 9, 2004 meeting in Watsonville. However, execution of the soil remediation treatment option shall incorporate our comments provided below:

1. The addition of bromide, a conservative tracer, within the TSA is recognized as a useful method in determining vadose zone and groundwater flow patterns. We recommend, based on previous site investigations in the Central Coast Region, that

California Environmental Protection Agency



background sampling for bromide be conducted prior to application. This may aid in determining if your tracer results are acceptable and accurate.

2. The RAWP mentions that Olin may, at a latter date, request an increase in the site soil remediation goal of 50 $\mu\text{g}/\text{kg}$. As we understand, your potential request would be based on the DHS Action Level change from 4 ppb to 6 ppb. While it may appear appropriate to change the remediation goal based on the DHS action level change, we are not inclined to do so. Ideally, the perchlorate soil remediation goal should be reflective of achieving background groundwater conditions, which is 0 ppb and not 4 ppb. However, since the most reasonable achievable detection limit for perchlorate is 4 ppb, staff is using that as its groundwater protection basis. This shall not be construed as a groundwater cleanup level, rather, it should be viewed a basis for moving remediation forward. Therefore, Regional Board staff will only consider approving a lower soil remediation goal at this time, unless the Regional Board approves a groundwater remediation goal higher than 4 ppb.
3. Olin is proposing to collect soil samples to determine the effectiveness of in situ and ex situ anaerobic bioremediation. The proposed soil sampling program for in situ bioremediation will analyze perchlorate, bromide, and acetate at 24 sample locations across the target soil area (TSA) yearly. Soil will be sampled using direct push technology and following sampling, the 16 ft soil core samples will be homogenized and analyzed for perchlorate. We have several concerns with the proposed sampling and analysis plan including:
 - a. The RAWP does not contain any provision for pre-remediation sampling to establish baseline concentrations. While some of the soil borings will be advanced in areas with numerous soil-boring data, some areas have little data. Additionally, eight of the locations are outside of the TSA 50 $\mu\text{g}/\text{kg}$ concentration contour. Regional Board staff acknowledges that this line demarcates an approximated 50 $\mu\text{g}/\text{kg}$ area limit. However, these locations could already be below 50 $\mu\text{g}/\text{kg}$, which will not aid Olin in determining if soil remediation is effective on affected soils. Therefore, Regional Board staff requests that pre-remediation soil sampling be conducted at all proposed soil-boring locations to establish baseline concentrations.
 - b. There are two areas with elevated concentrations of perchlorate that have confirmation soil borings situated in either outside the 50 $\mu\text{g}/\text{kg}$ area or are just inside. The attached figure shows the locations of these two areas. Regional Board staff requests that a sample boring be located in the middle of these areas. Our request is based on the fact that confirmation soil borings are located in high concentration areas, and the goal of soil sampling plan should not merely be to set up a random sampling grid, but to also confirm that areas with high concentrations are remediated.
 - c. The approach will not allow for measurement of potentially stratified perchlorate concentrations, and may miss areas of high concentrations. Homogenizing a 16 ft soil core may lead to a dilution of perchlorate soil concentrations that are contained in finer grain soils. At a minimum samples



- shall be collected at 0-1, 1-5, 5-10, and 10-15 ft depths to directly compare pre- to post-remediation soil concentrations.
- d. The RAWP proposes utilizing a 95% upper confidence limit (UCL) for soil testing. This statistical method for soil sampling is based on modeling the soil as a *single population*. However, the potential variety of soil types at each sampling locations could lead to inappropriate application of this statistical method. We request that you address appropriateness of using the UCL with soil populations that are not identical.
 4. According to the excavation plan detailed in the process description, soils containing perchlorate above 7,800 µg/kg will be excavated and bioremediated onsite. The RAWP did not include a plan to verify that soil above 7,800 µg/kg would be fully removed. To ensure complete excavation of soils above 7,800 µg/kg, we request that bottom and sidewalls soil samples be collected to confirm that perchlorate-contaminated soil above 7,800 µg/kg is removed. A proposal with the number and location of confirmation sampling shall be provided to the Regional Board by MONTH, DAY, YEAR.
 5. Infiltration unit construction is not proposed near the TSA southern extent. This is related to concerns regarding infiltration to and flooding of a nearby utility trench. Regional Board staff is concerned that this area will remain a source of perchlorate long after remediation ends. Since this area cannot be treated, plans to excavate and treat the soil may be appropriate. We ask that you address this and or other options for treatment.
 6. Our February 9, 2004 letter requested a RAWP soil and groundwater performance monitoring plan. The RAWP outlines your plans to install two additional shallow (0-15') wells, ten soil moisture sensors, and 10 soil lysimeters around and within the soil TSA. We are still concerned with the potential for lateral migration of perchlorate and or substrate. Rather than require additional shallow wells (0-15') we request that additional soil moisture sensors be installed. We believe this will provide an early indication of lateral migration and will provide time to: adjust the treatment system and allow for shallow well (0-15') and or lysimeters installation. We request that a soil moisture sensor be placed adjacent to each infiltration zone, including at the ends of the TSA. These probes shall be in place prior to TSA operation.

We request you provide a response to our comments by June 30, 2004. Your response shall include an application for Waste Discharge Requirements for enhanced bioremediation substrate addition. We have attached a Waste Discharge Application Form 200 for your use. We anticipate considering a waste discharge requirement waiver at the July 9, 2004 Regional Board meeting.

Pursuant to Section 13267 of the California Water Code, Olin Corporation is required to provide the above-requested information, or technical justification for not including it, by June 30, 2004. Failure to submit adequate or complete information may subject you to a Regional Board enforcement action. The Regional Board requires the Discharger to submit your response in

accordance with Section 13267 of the Water Code to determine the concentrations and movement of the perchlorate plume in the vicinity of the Olin site. We require Discharger to submit the information as the current and former owner of the property, and as one of the previous operators of a flare manufacturing facility that caused soil and groundwater perchlorate contamination at and in the vicinity of the Olin site at 425 Tennant Avenue, Morgan Hill.

Any person affected by this action of the Regional Board may petition the State Water Resources Control Board (State Board) to review the action in accordance with section 13320 of the California Water Code and Title 23, California Code of Regulations, Section 2050. The State Board must receive the petition within 30 days of the date of this order. Copies of the law and regulations applicable to filing petitions will be provided upon request.

If you have any questions, please contact **David Athey at (805) 542-4644** or Eric Gobler at (805) 549-3467.

Sincerely,



Roger W. Briggs
Executive Officer

Enclosures:

1. Comments from Komex on behalf of the Cities of Morgan Hill and Gilroy.
2. Comments from the Santa Clara Valley Water District
3. Figure 1
4. Form 200 Waste Discharge Application

DA: S:\SLIC\Regulated Sites\Santa Clara Co\Olin\OLIN-425 TENNANT AVENUE\COMMUNICATIONS - RICK McCLURE\RAWP&90_060704.doc

cc

cc via E-mail:

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State Water Resources Control Board

Mr. Jim Ashcraft
City of Morgan Hill

Mr. Rich Chandler
Komex

Mr. Peter Forest
San Martin County Water

Ms. Sylvia Hamilton
PCAG

Mr. Tom Mohr
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PCAG Members

Elected Officials

U.S. Environmental Protection
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ENVIRONMENT AND WATER RESOURCES

May 17, 2004
Project No.: 127-010

**California Regional Water Quality Control Board,
Central Coast Region**
895 Aero Vista Drive, Suite 101
San Luis Obispo, CA 93401
Attn: Mr. David Athey

Re: Comments on "Remedial Action Work Plan & 90% Design Report for Soil Remediation, Olin/Standard Fusee Site, Morgan Hill, California"

Dear Mr. Athey,

Komex has performed a review of the document entitled *Remedial Action Work Plan & 90% Design Report for Soil Remediation, Olin/Standard Fusee Site, Morgan Hill, California*, dated April 8, 2004, prepared by Geosyntec Consultants (Geosyntec) for the Olin Corporation (Olin). We are pleased to submit our comments on behalf of the Cities of Morgan Hill and Gilroy (our Clients). The former Olin facility at 425 Tennant Avenue in Morgan Hill is herein referred to as the Site. Perchlorate-impacted groundwater emanating from the Site has impacted numerous drinking water wells to the north, east, and south of the Site. Perchlorate-impacted soil at the Site continues to threaten groundwater quality off-Site.

The *Remedial Action Work Plan & 90% Design Report for Soil Remediation* (the Remedial Action Work Plan) was submitted by Olin to the California Regional Water Quality Control Board, Central Coast Region (Regional Board) in accordance with correspondence from the Regional Board dated February 9, 2004 requiring a work plan to perform combined ex-situ and in-situ bioremediation of on-Site perchlorate-impacted soil.

Our review of this document should in no way be considered a validation of the document contents or any portion of the document, including findings, interpretation, conclusions or opinions expressed therein. If we do not provide comments, corrections or questions for a respective sentence, paragraph or section, this should not be construed as agreement with the information presented within that respective sentence, paragraph or section.

While in general we found the Remedial Action Work Plan to be appropriate, and in compliance with Regional Board directives, we have concerns. The proposed plan cannot be considered to be protective of groundwater quality unless some of these concerns are addressed. Our key concerns are described in general as follows:

- There is no plan for sampling of soil in the sidewalls or bottom of the excavation to confirm removal of soil impacted with perchlorate in concentrations greater than 7,800 micrograms per kilogram (ug/kg);
- Locations for confirmation borings following soil remediation have not yet been specified; and,
- Additional monitoring wells in the A Zone are needed.

Our concerns are discussed in greater detail below.

The proposed area of excavation, as shown in Figure 3-2 of the Remedial Action Work Plan, is based on previous soil sampling results. While the area appears to be appropriate based on the previous results, a program of sampling of the excavation sidewalls and bottom should be conducted in order to assure that perchlorate-impacted soil in concentrations greater than 7,800 ug/kg have been removed for ex-situ remediation.

We also are interested in evaluating the locations of the confirmation borings to be advanced for verification of soil remediation. The proposed verification soil sampling program is an accepted Environmental Protection Agency methodology, but the results may be biased if sufficient numbers of borings are located within areas where initial perchlorate concentrations were low. We anticipate that the locations of confirmation borings will be presented prior to initiation of the verification soil sampling program, and that a reporting schedule for presenting the results will be established by the Regional Board.

As seen in Figure 3-7 of the Remedial Action Work Plan, there is an insufficient number of shallow groundwater monitoring wells to the north and east of the Infiltration Unit. As expressed in our previous comment letters concerning soil remediation, lateral migration of infiltration of infiltration water along relatively impermeable soil units is of great concern at the Site. The installation of additional A Zone groundwater monitoring wells north and east of the Infiltration Unit is warranted.

Komex is pleased to provide our comments to the Regional Board. If you have any questions or need additional information please call Rich Chandler at (805) 787-0307 x244.

Sincerely,
KOMEX



Rich Chandler, R.G.
Senior Geologist

cc: Mr. Steve Hoch, Hatch and Parent
Mr. Jim Ashcraft, City of Morgan Hill
Mr. Mike Goodhue, City of Gilroy



May 3, 2004

Mr. David M. Athey, P.E.
Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401-7906

Subject: Comments on *Remedial Action Work Plan & 90% Design Report for Soil Remediation, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California*

Dear Mr. Athey:

The Santa Clara Valley Water District appreciates the opportunity to provide comments on the 90% Design Report for Soil Remediation at the Olin/Standard Fusee Site. Overall, the proposal is appropriate for the aggressive removal of perchlorate from site soils using bioremediation techniques. The report is highly detailed, allowing thorough consideration of the proposed approach. We respect the lead author of this report, Evan Cox, as a national leader in the field of bioremediation of perchlorate, and we necessarily defer to his expertise in accepting most of the proposed remedial design. We nevertheless believe consideration of the following comments will help ensure the best possible outcome for remediation of perchlorate in soils at the Olin/Standard Fusee site:

Summary Comments

- 1) Reference to the EPA's Residential Soil Preliminary Remediation Goal seems misplaced – the project goal should be groundwater protection, not managing risk from contact exposure.
- 2) Revising the soil remediation goal to reflect the changed Public Health Goal/Action Level is inconsistent with the objective of source elimination, particularly for bioremediation methods, which the authors assert have completely reduced perchlorate at numerous sites. Leaving the remedial goal, 50 µg/kg, intact provides an additional factor of safety.
- 3) The proposed techniques for verifying completion of soil remediation are inherently biased to favor results showing low concentrations. Homogenizing 16 ft cores of soil before analysis should not be allowed. The assumptions implicit in the selection of the recommended statistical technique may not be valid.
- 4) Confirmation samples should be obtained from the floor and sidewalls of the excavation to confirm the excavation has completely removed soils above the selected excavation threshold, 7.8 mg/kg.
- 5) A reporting schedule should be adopted, and minimum reporting requirements established.

- 6) Additional A-zone wells are needed to confirm addition of liquid substrate does not cause migration of perchlorate in unexpected directions.

COMMENTS:

The selected soil excavation criteria, 7,800 µg/kg, is the EPA residential preliminary remediation goal (PRG). The assertion is made that this is a 'highly conservative' approach because the site is zoned commercial/industrial, and EPA's industrial PRG is 100,000 µg/kg. Emphasizing a contact exposure threshold seems inappropriate for a project whose purpose should be source removal for groundwater protection. The goal of soil remediation at the Olin/Standard Fusee site is protection of drinking water, not protection of future residents or workers from possible contact exposure to perchlorate in soil. EPA's groundwater PRG is 3.6 µg/L. The San Francisco Bay RWQCB's *Environmental Screening Level* (ESL) for perchlorate in soil overlying drinking water sources is 7 µg/kg, regardless of whether the land use is residential or commercial. The low concentrations threshold used for the ESL reflects the limited capacity of soil to retard perchlorate migration to underlying groundwater. The objective of the soil remediation effort must be source elimination for protection of groundwater, the sole source of drinking water for residents of the Llagas Valley. We have accepted that some threshold number must be chosen as the cut-off between soil excavation and in situ bioremediation for the purpose of minimizing risk while optimizing cost, but we do not accept use of the EPA Soil PRG, intended as a guideline for contact exposure, as the cut-off for excavation with any reference to the associated risk. The adopted remedy, excavation with ex-situ remediation and in situ treatment of the Target Soil Area, is intended to eliminate perchlorate in soil as a continuing source of groundwater contamination.

The report states that Olin would seek a change in the remedial goal based on the recent adoption of a higher DHS provisional Action Level at 6 µg/L, as opposed to the 4 µg/L Action Level in effect during the early design phase of this project. Because the proposed approach has been highly successful at bringing perchlorate tainted soils to non-detect (<4 µg/kg) levels at other sites, there should be no need to revisit the remedial goal. Instead, the changed regulatory guidance should be seen as providing an additional factor of safety.

We have three concerns regarding the proposed means of verifying effectiveness and completion of the remedial effort:

1) The number of samples proposed is inconsistent with the statistical technique proposed for evaluating whether remedial targets have been met. According to the Pro UCL user manual, using less than 15 samples requires application of ancillary statistical techniques, suggesting that less statistical power is provided by limiting the confirmation analyses to only a dozen samples.

2) The proposed practice of homogenizing samples will obscure data that might inform us of the progress of the bioremediation effort. Mixing a 16 ft core will impose a strongly negative bias on results. This approach ignores any stratification of soils that may control delivery of the calcium magnesium acetate substrate and prevent effective treatment in some zones. Depth discrete sampling in the zone treated by in situ methods should be required to verify effectiveness of the remediation effort. Because the excavated soils will be mixed, sample homogenization is acceptable in the treated soil pile.

3) The use of the 95% upper confidence limit presupposes that various soil types exhibit identical properties with respect to perchlorate occurrence. The Pro UCL user manual states: "It should be emphasized that the computation of an appropriate 95% UCL is based upon the assumption that the data set under study consists of observations only from a *single population*." More porous materials (clays) may harbor greater perchlorate mass than sands due to inherent structural differences. Lumping different soil types together without confirming that soil type can be dismissed as a dependent variable distinguishing separate sample populations would probably result in a misapplication of the selected statistical method.

In addition, confirmation sampling at the base and sidewalls of the excavation is not addressed. Confirmation sampling should be required to assure that concentrations above the selected excavation threshold, 7.8 mg/kg, are removed.

The report makes no mention of reporting. A description of the report contents and schedule should be provided.

Additional A-zone monitoring wells are needed on north and east sides to confirm that the infiltration of carbon substrate does not cause lateral migration of perchlorate in unexpected directions.

This concludes our comments. We recommend that the Work Plan be amended in consideration of the above comments for verifying remedial effectiveness, and that homogenizing soil cores not be allowed. Because our concerns are related to verification of remediation, work on excavation and installation of the bioremediation system should not be delayed. Should RWQCB concur with our recommendations on verification methods, revisions to the sections of the Work Plan concerning proposed verification methods may be made concurrent with field work.

ORIGINAL SIGNED BY: *Thomas K. G. Mohr*

Thomas K.G. Mohr, R.G., C.E.G., C.H.
Solvents and Toxics Cleanup Liaison



FIGURE